AVONIC

Avonic PTZ Camera 20x zoom

AV-CM40

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INTRODUCTION

Thank you for your Avonic purchase. Before beginning to operate this device, please read the manual in order to make sure the best performance is obtained. Save this manual for future reference.

Contact

For any questions or suggestions, contact your reseller or the local distributor of Avonic. Find the local distributor on the website of Avonic. For the most recent version of the manual or datasheet, look at the Avonic website: www.avonic.eu

Join Avonic

facebook.com/avonicPTZ

linkedin.com/company/avonic

twitter.com/avonic

Safety Notes

- Installation and servicing should only be done by Qualified Service Personnel and conform to all local codes.
- This unit is designed for indoor use only and it must not be installed where exposed to water or other liquids and moisture.
- Before powering on the device, check the input power voltage carefully.
- Avoid shock and vibration when transporting and installing the device.
- Electronic devices produce heat. Do not block the ventilation slots of the device and make sure the installation environment is well ventilated to avoid overheating.
- Before cleaning, unplug the power cable. Use a soft, damp cloth to clean the device, do not use strong or abrasive detergent to clean that will damage the device.
- If you wish to dispose this product, please contact Avonic to obtain info about the disposal procedure.

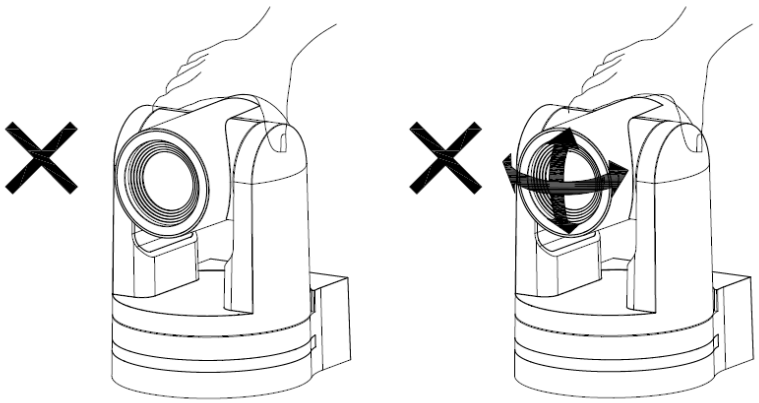
PACKAGE CONTENTS AND ACCESSORIES

Contents

Quantity	Description	Avonic SKU
1 pc	PTZ Camera	AV-CM40
1 pc	Power Supply 12V/A	AV-CM40-PSU
1 pc	Remote Control	AV-CM40-RC
1 pc	USB cable type A to type A	AV-USB20-AA
1 pc	RS232 9-pin male to 8-pin male	AV-CM-RS232

Handling precautions

Be cautious to take the camera by its base. When placing back the camera in its protective foam, be sure the lens is in horizontal position.



Accessories

Avonic Ceiling mount
SKU white : CM-CMW
SKU black: CM-CMB

Avonic Wall mount
SKU white : CM-WMW
SKU black: CM-WMB

Wall and Ceiling mount
SKU white : AV-MT200-W
SKU black: AV-MT200-B

PRODUCT OVERVIEW

The Avonic CM40 is a high-quality PTZ camera, with an HDMI, USB2.0 and 3G-SDI output. The camera is designed for fixed installations and high quality video in low light conditions. The camera is equipped with high quality components like a Panasonic CMOS sensor and a glass lens with 20x optical zoom. Control the camera over RS232 or RS485 with any controller with VISCA or PELCO support.

Features

- Panasonic high-quality 1/2.8 inch, 2.07 million effective pixels HD CMOS sensor
- The output frame rate up to 60fps in 1080P
- 20x Optical Zoom, glass lens.
- Remote Control Using RS232/485 interface, all the parameters of the camera can be remotely controlled.
- Leading autofocus algorithm for a fast, accurate and stable auto-focusing lens.
- Low noise and High SNR: Low Noise CMOS effectively ensures high SNR of the camera.
- Advanced 2D/3D noise reduction technology is also used to further reduce the noise while ensuring image sharpness.
- High accuracy, silent step driving motor makes for accurate fast and quiet panning and tilting.
- Multi-Format Video Outputs: HDMI 1.4a, 3G-SDI, USB2.0.
- The 3G-SDI is available for 100m transmission at 1080p60 format (SMPTE 424M). The output image is 8-bit YCbCr 4:2:2 level A (SMPTE 425M).
- Auto-Flip function
- Low-power sleep function: the consumption is lower than 500mW in sleep mode.
- Supports Multiple Control Protocols: VISCA, PELCO-D, PELCO-P protocols which can also be automatically recognized.

INSTALLATION

Connections

1. 3.5mm jack audio Line in, embeds audio on HDMI and SDI
2. RS-485 two-wire serial communication with 2-pin Phoenix connector
3. System Selector (see Installation for more details)
4. RS-232 mini-DIN-8 IN (connect the supplied RS-232 cable)
5. RS-232 mini-DIN-8 OUT for daisy chaining RS-232 connection
6. 3G-SDI video output SMTPE 424M compliant
7. HDMI Type A
8. USB2.0 Type A, UVC video output
9. RJ45 Ethernet connection (firmware update and Visca over IP control)
10. DC12V power with locking screw (connect the supplied DC PSU)
11. Power ON/OFF

System Select Switch

0	1080p60	8	720p30
1	1080p50	9	720p25
2	1080i60	A	1080p59.94
3	1080i50	B	1080i59.94
4	720p60	C	720p59.94
5	720p50	D	1080p29.97
6	1080p30	E	720p29.97
7	1080p25	F	Via OSD/Webgui

CAUTION:

a. After changing the switch, you need to restart the camera to take effect.

b. 720 p30 and 720 p25 only supported by the HDMI output.

c. There are three ways to select the video output (via OSD, direct button combination on the remote control, or via the rotary dial) of the camera, but the rotary dial takes priority after a reboot, except on setting F where all the outputs are defined digitally.

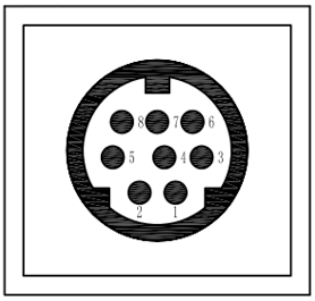
Power adapter

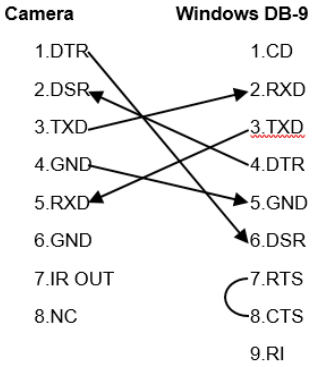
This equipment is equipped with a 12V/2A DC power supply. Insert the power supply according to the requirements, turn on the power switch.

Power On

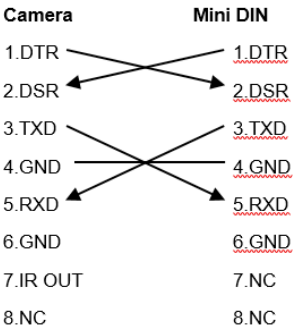
Pan-Tilt will rotate to the maximum position of top right after the camera started, then it returns to the center, the process of initialization is finished. (Note: If the position preset 0 has been stored, the position preset 0 will be called after initialization). From this point onwards the user can control the camera with RC or Serial Communication.

RS232 Interface



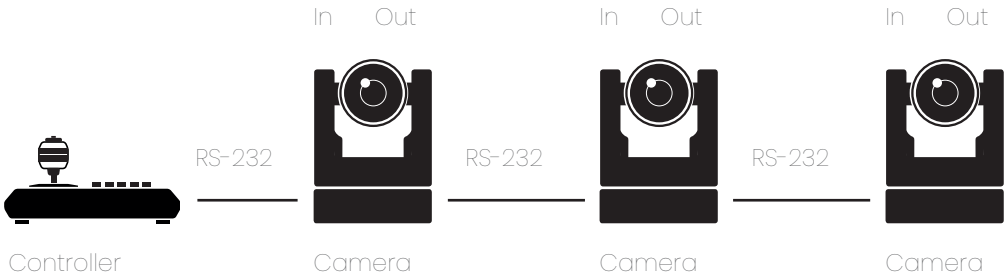


No.	Function
1	DTR
2	DSR
3	TXD
4	GND
5	RXD
6	GND
7	IR OUT
8	NC



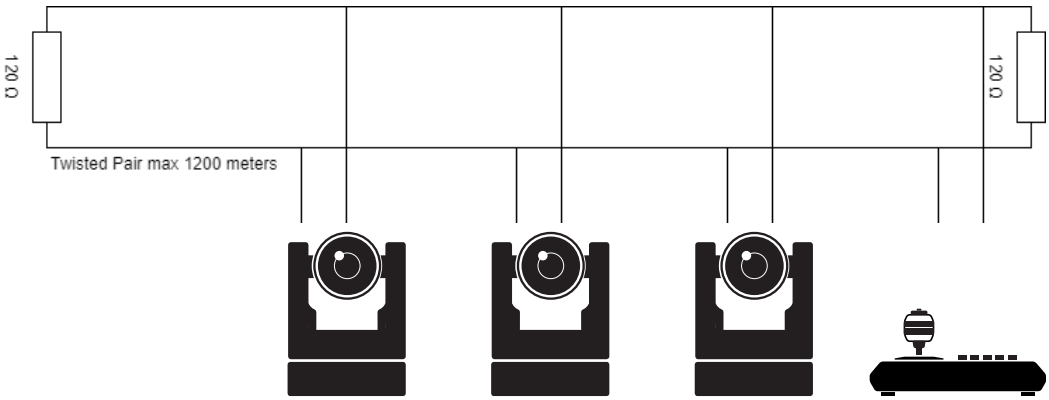
RS232 network connection diagram

When connecting multiple cameras through RS-232, use daisy chaining network architecture. Max cable length for RS-232 is 10-15m.



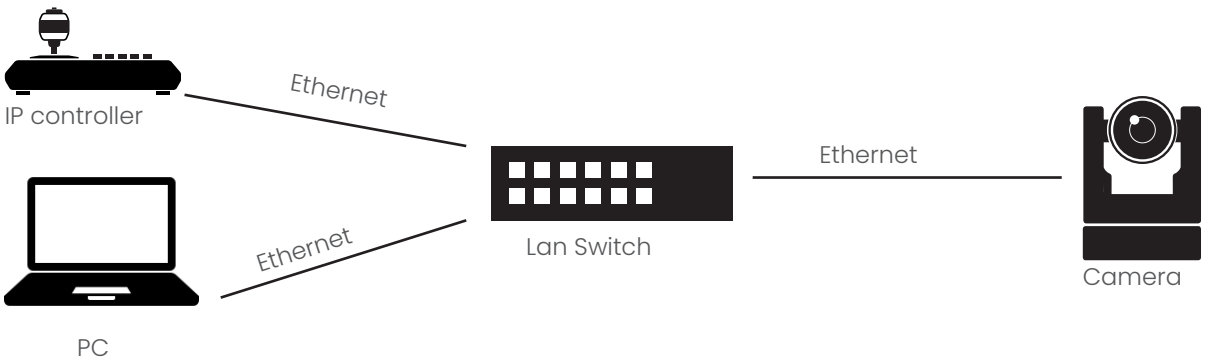
RS485 network connection diagram

To connect multiple cameras by RS485, the cameras are attached to a 2-wire twisted pair bus (max length 1200m) that is terminated at both ends with a 120 Ω impedance resistor. The maximum distance from the bus to the camera or controller is 5m.



IP network connection diagram

Connect an Avonic camera to a LAN using a standard switch
Addressing is done via IP, the Visca address in a Visca over ip environment is always 1.



OPERATION

Remote controller

a. Power

b. Set

c. Camera select

d. Number Keys

e. Focus + -

f. Auto/Manual Focus

g. Zoom + -

h. Set & Clear Preset

i. PTZ keys (up/down/left/right)

j. Home

k. BLC (Back Light Control) ON/OFF

l. Menu

m. Function Keys (F1/F2/F3/F4)

n. Blank buttons

a. Power

Press the power button to turn on the camera. If the position preset 0 has been stored, the position preset 0 will be called after initialization. Press the power button again to turn the camera off, it will turn to the back when turned off, this is called the “privacy mode”.

b. Set

This button has no function with this camera.

c. Camera select

Up to 4 different cameras can be controlled with 1 IR remote Control. With the camera select buttons [1,2,3,4] you can select the IR channel the remote control is using. The default camera IR channel is 1.
To control a camera on first use, please select camera 1 (IR channel 1) on the remote control. To control a second camera you first need to change the IR channel stored in the camera from 1 to 2.

- First turn off the other camera’s in the room you don’t want to change, to prevent that other camera’s also get changed accidentally.
- Select camera 1 on the remote control, because the camera is still configured to listen to IR channel 1.
- Press [*]+[#]+[F2] to change the IR channel inside the camera to IR channel 2. The camera will confirm this on screen.
- Select camera 2 on the remote control to control this camera.

Key Combinations: (Default IR address is 1)

[*]+[#]+[F1]	: Camera Address No. 1	[*]+[#]+[F3]	: Camera Address No. 3
[*]+[#]+[F2]	: Camera Address No. 2	[*]+[#]+[F4]	: Camera Address No. 4

d. Number Keys

The number keys are used to call presets. Press the number [0-9] of the preset desired and the camera will respond accordingly (See ‘**h**’ on how to set & clear presets)

e. Focus + -

Push the button [manual focus] first before using the focus buttons. Focus the camera with the [+] and [–] button. If the camera does not respond check if the camera is set to auto-focus.

f. Auto/Manual Focus

Set the camera in auto-focus or manual-focus. If the camera is configured to auto-focus the buttons [Focus + -] are disabled. When the camera is in “manual focus” modus and the Zoom buttons are used, the camera automatically switces to auto-focus.

g. Zoom + -

Zoom the camera with these buttons. When the camera is in “manual focus” modus and the Zoom buttons are used, the camera automatically switches to auto-focus.

h. Set & Clear Preset

A preset is a specific position of a camera that you save into the camera. A preset is assigned to a number from 0-9. To set a preset first point the camera in a specific directing and a specific zoom position. Now assign the position to a number with the button “Set Preset”. You can call the preset by pressing the number 0-9 on the remote control.

Set Preset:	[SET PRESET]+[<number>]
Call Preset:	[<number>]
Clear Preset:	[CLEAR PRESET]+[<number>]

If the position preset 0 has been stored, this position will be called after initialization.

i. PTZ keys (up/down/left/right)

Move the camera in a direction.

j. Home

Set the direction of the camera to a center position.

k. BLC (Back Light Control) ON/OFF

Change the Back light control setting.

l. Menu

The Menu button opens the "On Screen Display (OSD)" menu. This menu is visible on the HDMI/SDI/IP output. If the menu is not in English, please press [*]+[#]+[4] to change the Menu language to English.

m. Function Keys (F1/F2/F3/F4)

Used to configure the IR channel of the camera. See [**c**. Camera select] above for instructions.

n. Blank buttons

These buttons have no function with this camera.

Other Key Combinations

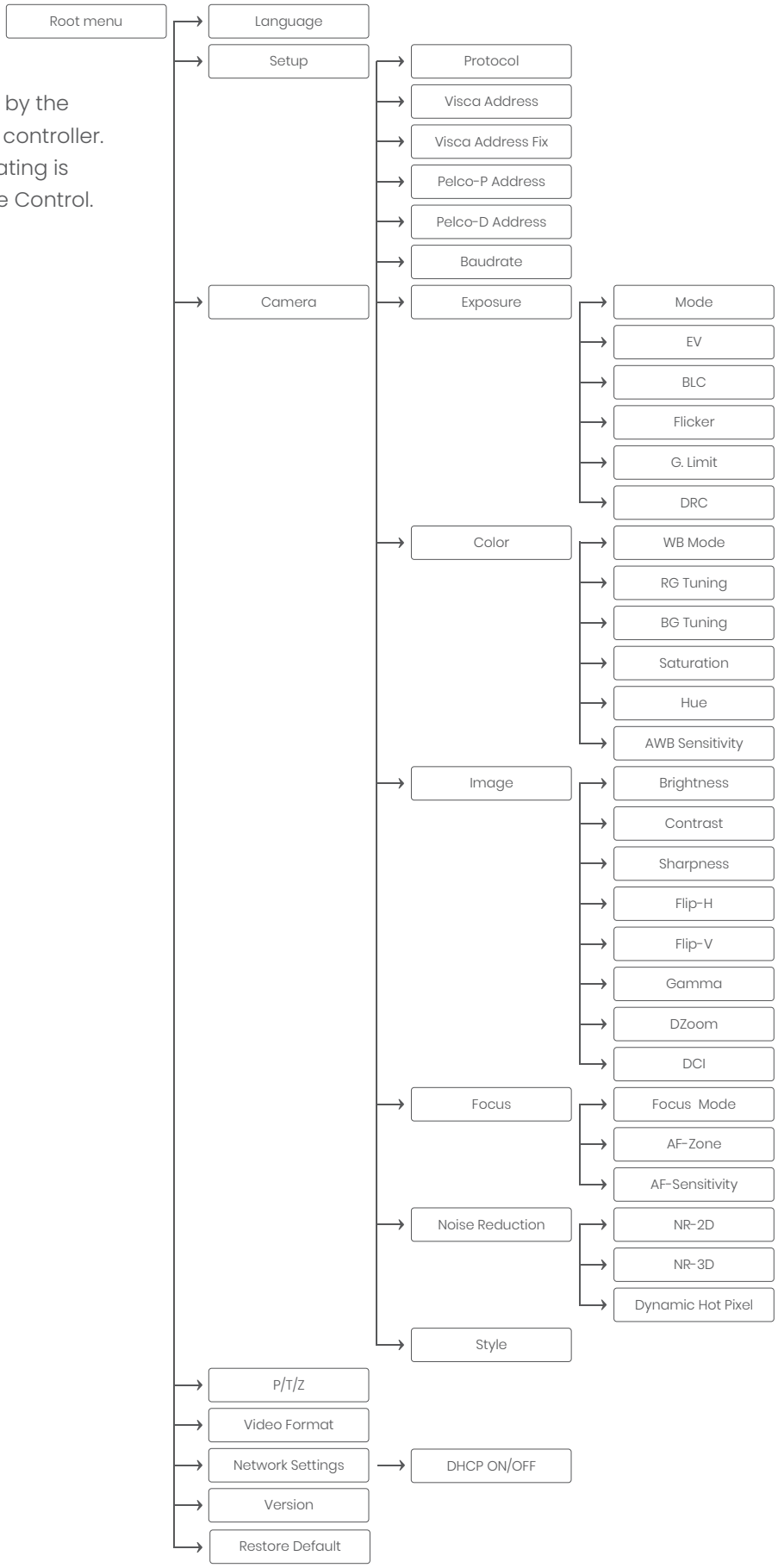
[*]+[#]+[4]	: Menu set to English
[*]+[#]+[6]	: Restore factory defaults
[*]+[#]+[9]	: Flip switch (just temporary flip to view the image flipped)
[*]+[#]+[Auto]	: Enter into the aging mode, only for quality control purposes
[*]+[#]+[Manual]	: Restore the default username, password, and IP address

[#]+[#]+[#]	: Clear all presets
[#]+[#]+[0]	: Switch the video format to1080p60*
[#]+[#]+[1]	: Switch the video format to 1080p50*
[#]+[#]+[2]	: Switch the video format to 1080i60*
[#]+[#]+[3]	: Switch the video format to 1080i50*
[#]+[#]+[4]	: Switch the video format to 720p60*
[#]+[#]+[5]	: Switch the video format to 720p50*
[#]+[#]+[6]	: Switch the video format to 1080p30*
[#]+[#]+[7]	: Switch the video format to 1080p25*
[#]+[#]+[8]	: Switch the video format to 720p30*
[#]+[#]+[9]	: Switch the video format to 720p25*

***NOTE: THE CAMERA RETURNS TO THE VIDEO OUTPUT SETTING OF THE ROTARY DIAL AFTER A REBOOT**

OSD MENU

The OSD menu can be accessed by the Remote Control or an Avonic PTZ controller. In the following pages, the navigating is described for using the IR Remote Control.



1. MENU

Press [MENU] button to display the main menu on the screen. Use the arrow buttons to move the cursor to the item to be set. Press the [HOME] button to enter the corresponding sub-menu.

MENU		
▶	Language	EN / CN
	Setup	
	Camera	
	P/T/Z	
	Version	
	Restore Default	
▼▲	Select Item	
◀▶	Change Value	
[Home] Enter		
[Menu] Exit		

2. SETUP

SETUP		
▶	Protocol	AUTO / VISCA / PELCO-D / PELCO-P
	Visca Address	1 ~ 7
	Visca Address Fix	ON / OFF
	PELCO-P Address	1 ~ 255
	PELCO-D Address	1 ~ 255
	Baudrate	2400 / 4800 / 9600 / 115200 / 38400
▼▲	Select Item	
◀▶	Change Value	
[Menu] Back		

3. CAMERA

CAMERA		
▶	Exposure	
	Color	
	Image	
	Focus	
	Noise Reduction	
	Style	Soft / Default / Normal / Clarity / Bright
▼▲	Select Item	
◀▶	Change Value	
[Menu] Back		

3.1 EXPOSURE

EXPOSURE		
▶	Mode	Auto / Manual / SAE / AAE / Bright
	Iris	F11 ~ F1.8 / CLOSE
	Shutter	1/25 ~ 1/10000
	EV	ON / OFF
	EV Level	-7 ~ +7
	BLC	ON / OFF
	Flicker	50Hz / 60Hz / OFF
	G. Limit	0 ~ 15
	DRC	1 ~ 8 / CLOSE
▼▲	Select Item	
◀▶	Change Value	
[Menu] Back		

3.2 COLOR

COLOR		
▶	WB Mode	Auto / 3000K / 4000K / 5000K / 6000K / 7000K / Manual / OnePush
	RG Tuning	-10 ~ 10
	BG Tuning	-10 ~ 10
	RG	0 ~ 255
	BG	0 ~ 255
	Saturation	60% ~ 200%
	Hue	0 ~ 14
	AWB Sensitivity	Low / Middle / High
▼▲	Select Item	
◀▶	Change Value	
[Menu] Back		

3.3 IMAGE

The Flip function can be set, although the camera has an automatically flip function.

IMAGE		
▶	Brightness	0 ~ 14
	Contrast	0 ~ 14
	Sharpness	0 ~ 15
	Flip-H	ON / OFF
	Flip-V	ON / OFF
	B&W-Mode	Color / B&W
	Gamma	0.45 / 0.50 / 0.55 / 0.63 / Default
	DZoom	ON / OFF
	DCI	1 ~ 8 / Close
▼▲	Select Item	
◀▶	Change Value	
[Menu] Back		

3.4 FOCUS

FOCUS		
▶	Focus Mode	Auto / Manual / OnePush
	AF-Zone	Top / Center / Bottom / All
	AF-Sensitivity	Low / Middle / High
▼▲	Select Item	
◀▶	Change Value	
[Menu] Back		

3.5 NOISE REDUCTION

NOISE REDUCTION		
▶	NR-2D	1 ~ 7 / Auto / OFF
	NR-3D	1 ~ 8 / OFF
	Dynamic Hot Pixel	1 ~ 5 / OFF
▼▲		
◀▶	Select Item	
	Change Value	
[Menu] Back		

4. PTZ

PTZ

▶	Speed by Zoom	ON / OFF
	Zoom Speed	1 ~ 8
	Image Freezing	ON / OFF
	Acc Curve	Slow / Fast

▼▲ Select Item

◀▶ Change Value

[Menu] Back

5. NETWORK

NETWORK SETTING

▶	DHCP	ON/ OFF
	IP Address	xxx.xxx.xxx.xxx

[Menu] Back

6. VERSION

VERSION

▶	MCU Version	nr	date
	Camera Version	nr	date
	AF Version	nr	date

[Menu] Back

7. RESTORE DEFAULT

RESTORE DEFAULT

▶	Restore default?	NO / YES

▼▲ Select Item

◀▶ Change Value

[Menu] Back

[Home] OK

Serial Communication Control

COM port settings

In default working mode, an Avonic camera is able to connect to a VISCA controller with RS-232 or RS-485 serial interface.

The camera can be controlled via RS-232, the parameters of RS-232C are as follows:

- Baud rate: 2400/4800/9600/115200
- Start bit: 1 bit.
- Data bit: 8 bits.
- Stop bit: 1 bit.
- Parity bit: none.

The camera can be controlled via RS-485, Half-duplex mode. The parameters are:

- Baud rate: 2400/4800/9600
- Start bit: 1 bit.
- Data bit: 8 bits.
- Stop bit: 1 bit.
- Parity bit: none.

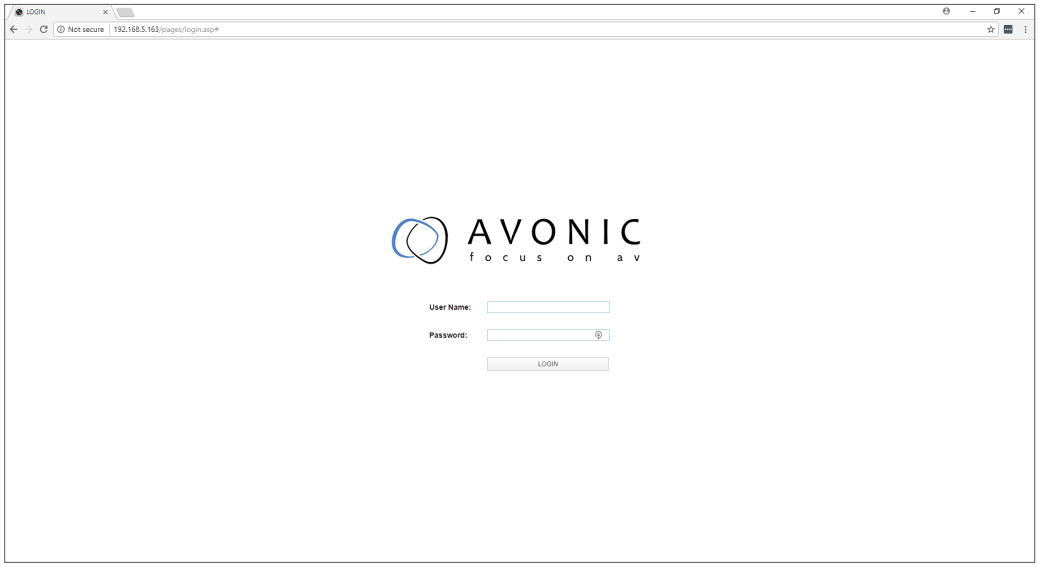
WebGUI

The camera is equipped with a WebGUI to perform a firmware upgrade and make basic changes to the IP address.

Login

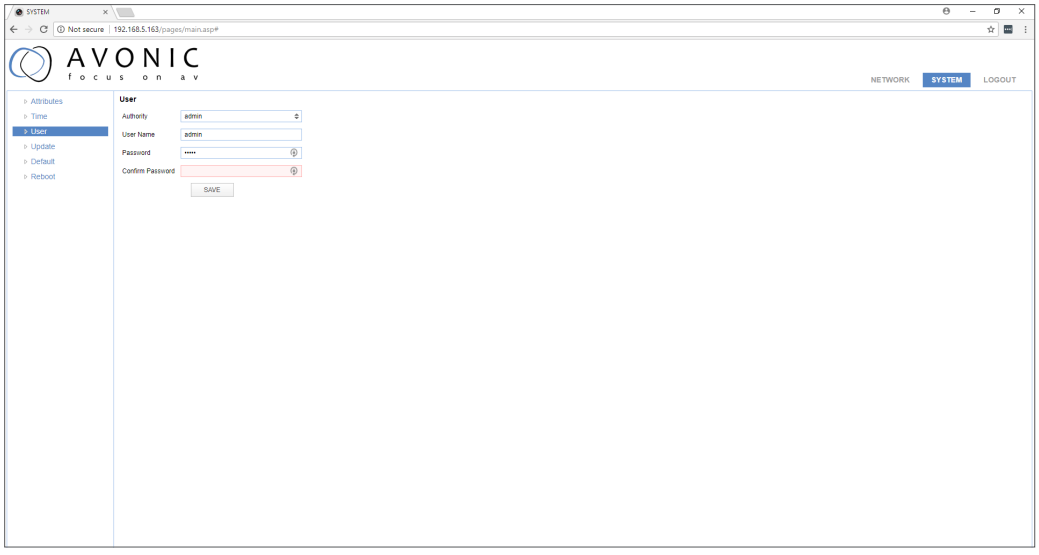
The default IP address is: **192.168.5.163**
The default username is : **admin**
The default password is : **admin**

The login screen looks like this:



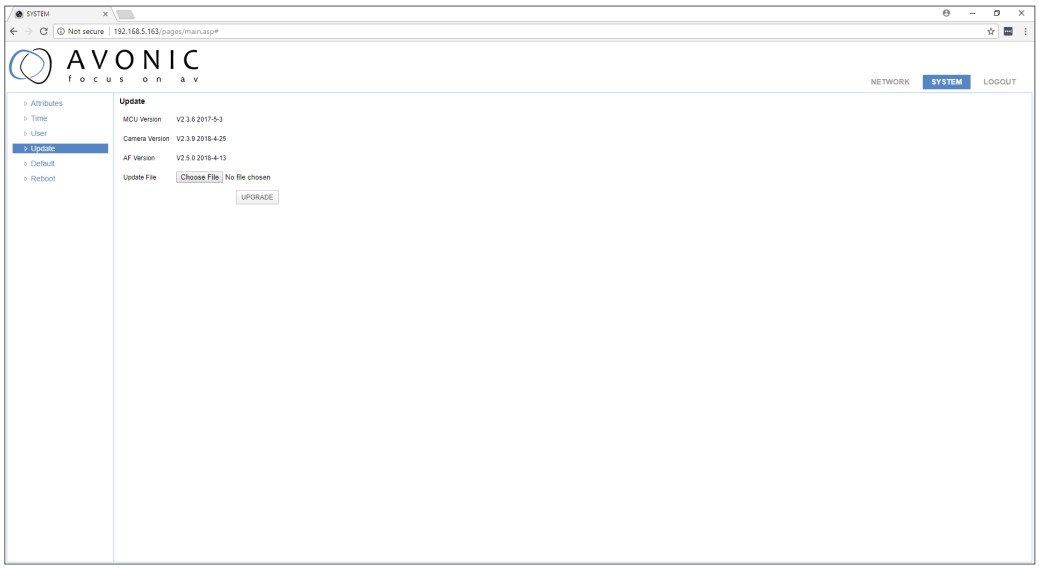
System

In the System Tab it is possible to change username and password, perform a firmware upgrade, reset the camera to Default settings and Reboot the camera.



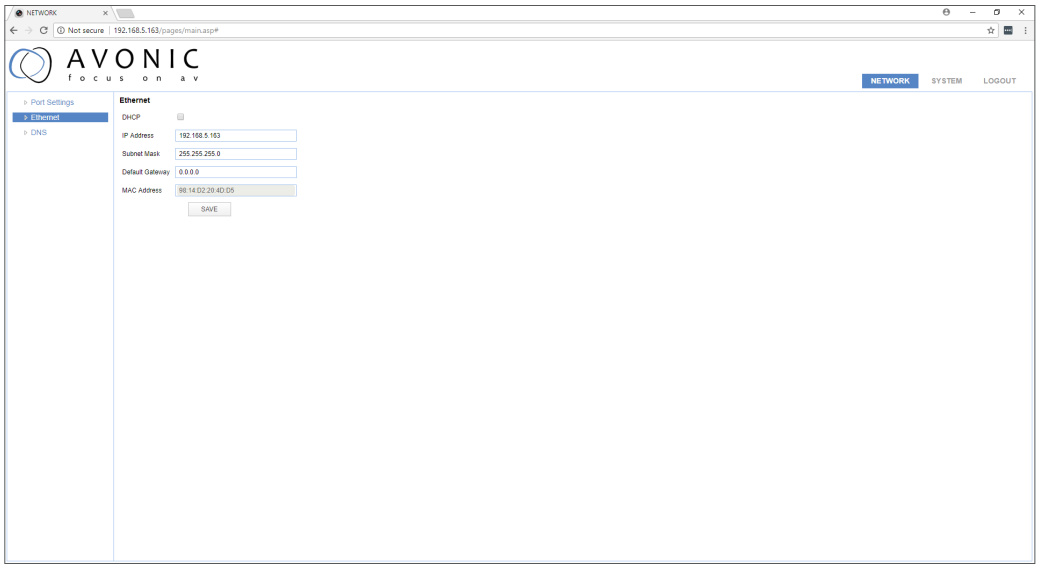
Update

The update form gives information on the current firmware versions and the possibility to update the firmware by choosing an upgrade file provided by Avonic. Do not turn off the camera while updating.



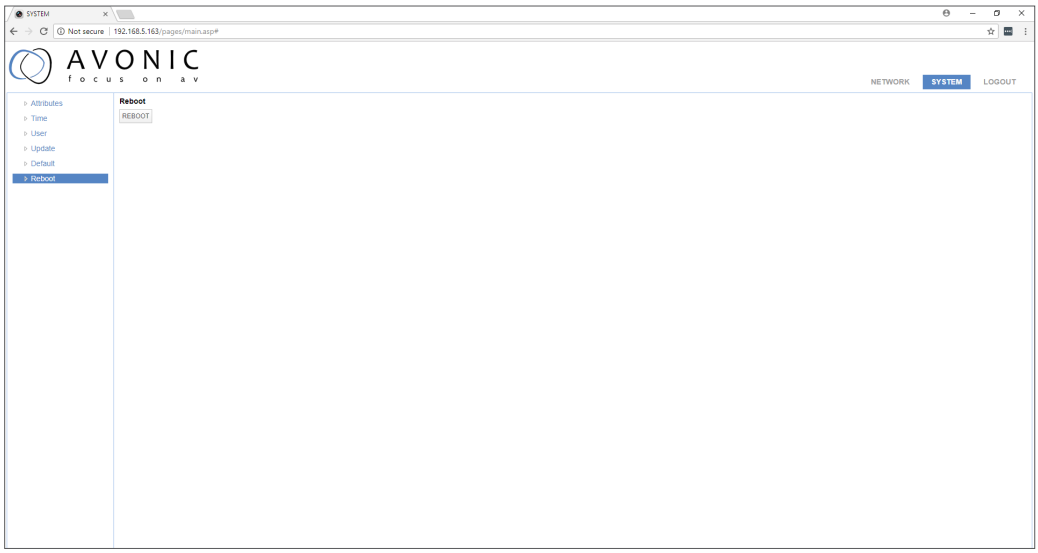
Network

In the Network Tab network IP settings can be changed. These settings involve DHCP or fixed IP address, DNS- and port settings. Save changed settings and Reboot the camera to activate any changes.



Reboot

If any changes made, these settings will only take effect after a reboot of the camera.



MAINTENANCE

Camera Maintenance

- If the camera will not be used for a long time, please turn off the power switch, disconnect AC power cord of AC adaptor to the outlet.
- Use soft cloth or tissue to clean the camera cover.
- Please use the soft dry cloth to clean the lens. If the camera is very dirty, clean it with diluted neutral detergent. Do not use any type of solvents, which may damage the surface.

Unauthorized Use

- Do not film extreme bright objects for a prolonged period of time, such as sunlight, light sources, etc.
- Do not operate in unstable lighting conditions, otherwise the produced image could be less than optimal.
- Do not operate close to powerful electromagnetic radiation, such as TV or radio transmitters, etc.

TROUBLESHOOTING

General Advice

- Turn the camera off and on again and check if the problem persists.
- Restore to Factory Default

Power Issues

- No self-test (applies only to PTZ cameras) and no power LED
  - Check the net power
  - Check the power supply
  - Check the physical power button on the back of the camera

Image

- No image
  - Check power of camera and monitor
  - Check video cable quality and length
  - Check if video specifications of monitor match the specs of the camera
- Abnormal image
  - Check video cable quality and length
  - Check cable connections
- Dithering or flickering image
  - Check camera fixation and nearby vibration sources
  - Check anti-flickering setting in OSD
  - Check Noise Reduction settings in OSD
- Color issues
  - Check options in OSD, like exposure, white balance, color temp, Red and Blue tuning

Control

- No self-test (PTZ cameras only) and no power LED
  - Check the net power
  - Check the power supply
- Remote Controller does not work
  - Check power of the controller
  - Check RS-232 or RS-485 cable quality, length, polarity and network architecture
  - Check serial communication settings on both camera and controller
  - Check VISCA / PELCO address settings on both camera and controller
  - Check IP network settings on both camera and controller

WebGUI

- Cannot enter WebGUI
  - Check network cable
  - Check if PC is in the same subnet as camera
  - Reset the factory default ip settings by pressing [*] [#] [Manual] and Reboot
- Firmware update failed
  - Check firmware file integrity, download it again.

VISCA OVER SERIAL PROPERTIES

Replace the '1' in all the '81' addresses with the serial Visca address set in the camera to control it.

VISCA OVER IP PROPERTIES AND COMMAND LIST

The Avonic IP camera is implemented with a TCP server. The TCP port number is 1259 by default and can be altered in the WebGUI. Once the connection between client and server is set up, the client will be able to send PTZ commands to the server. The server then parses and executes the PTZ command.

The Avonic IP Camera also has an implemented UDP server. The UDP port number is fixed on 1259. Once the connection between client and server is set up, the client will be able to send PTZ commands to the server. The server then parses and executes the PTZ command.

The VISCA over IP command list is based on the VISCA protocol. Not all VISCA commands are implemented.

The PTZ Command format is according to the definition of the VISCA protocol. The VISCA address of the camera is set to 1 by default and can be changed in the WebGUI. As all cameras are uniquely identified by their IP address, all VISCA addresses of the cameras that are controlled over IP do not necessarily have to be unique.

Default settings:

TCP port	1259
UDP port	1259 (same port as TCP; is correct)
VISCA address	1

1. Camera return commands

x = Camera Address
y = Socket Number
z = Camera Address + 8

All parameter values are in HEX

Return/complete Command			
Command	**Function**	**Command Packet**	**Comments**
ACK/Completion Messages	ACK	90 4y FF (y: Socket No.)	Return when the command is accepted.
	Completion	90 5y FF (y: Socket No.)	Return when the command has been executed.

Error command			
Command	**Function**	**Command Packet**	**Comments**
Error Messages	Syntax Error	90 60 02 FF	Returned when the command format is different or when a command with illegal command parameters is accepted.
	Command Buffer Full	90 60 03 FF	Indicates that two sockets are already being used(executing two commands) and the command could not be accepted when received.
	Command Canceled	90 6y 04 FF (y: Socket No.)	Returned when a command which is being executed in a socket specified by the cancel command is canceled. The completion message for the command is not returned.
	No Socket	90 6y 05 FF (y: Socket No.)	Returned when no command is executed in a socket specified by the cancel command, or when an invalid socket number is specified.
	Command Not Executable	90 6y 41 FF (y: Execution command Socket No. Inquiry command: 0)	Returned when a command cannot be executed due to current conditions. For example, when commands controlling the focus manually are received during auto focus.

2 Camera control commands

x = Camera Address
y = Socket Number
z = Camera Address + 8

All parameter values are in HEX

Camera control commands			
Command	**Function**	**Command Packet**	**Comments**
Address Set	Broadcast	88 30 01 FF	Address setting
CAM_Power	On	81 01 04 00 02 FF	Power On (serial only)
	Off	81 01 04 00 03 FF	Power Off
CAM_Zoom	Stop	81 01 04 07 00 FF	
	Tele (Standard speed)	81 01 04 07 02 FF	
	Wide (Standard speed)	81 01 04 07 03 FF	
	Tele (Variable speed)	81 01 04 07 2p FF	p = 0(low speed) - F(high speed)
	Wide (Variable speed)	81 01 04 07 3p FF	
	Direct	81 01 04 47 0p 0q 0r 0s FF	pqrs(0-F): Zoom Position
CAM_Focus	Stop	81 01 04 08 00 FF	
	Far (Standard speed)	81 01 04 08 02 FF	
	Near (Standard speed)	81 01 04 08 03 FF	
	Far (Variable speed)	81 01 04 08 2p FF	p = 0(low) - F(high)
	Near (Variable speed)	81 01 04 08 3p FF	
	Direct Focus Position	81 01 04 48 0p 0q 0r 0s FF	min p = 0, q = 0, r = 0, s = 0 max p = 0, q = 6, r = E, s = A
	Auto Focus	81 01 04 38 02 FF	AF On
	Manual Focus	81 01 04 38 03 FF	AF Off
	Auto/Manual	81 01 04 38 10 FF	AF Toggle On/Off
CAM_ZoomFocus	Direct	8x 01 04 47 0p 0q 0r 0s 0t 0u 0v 0w FF	pqrs: Zoom Position tuvw: Focus Position

CAM_WB	Auto	81 01 04 35 00 FF	Normal Auto
	Indoor mode	81 01 04 35 01 FF	Indoor mode
	Outdoor mode	81 01 04 35 02 FF	Outdoor mode
	OnePush mode	81 01 04 35 03 FF	One Push WB mode
	Manual	81 01 04 35 05 FF	Manual Control mode
	OnePush trigger	81 01 04 10 05 FF	One Push WB Trigger
CAM_RGain	Reset	81 01 04 03 00 FF	Manual Control of R Gain
	Up	81 01 04 03 02 FF	
	Down	81 01 04 03 03 FF	
	Direct	81 01 04 43 00 00 0p 0q FF	pq: R Gain
Camera control commands			
Command	**Function**	**Command Packet**	**Comments**
CAM_Bgain	Reset	81 01 04 04 00 FF	Manual Control of B Gain
	Up	81 01 04 04 02 FF	
	Down	81 01 04 04 03 FF	
	Direct	81 01 04 44 00 00 0p 0q FF	pq: B Gain
CAM_AE	Full Auto	81 01 04 39 00 FF	Automatic Exposure mode
	Manual	81 01 04 39 03 FF	Manual Control mode
	Shutter priority	81 01 04 39 0A FF	Shutter Priority Auto-matic Exposure mode
	Iris priority	81 01 04 39 0B FF	Iris Priority Automatic Exposure mode
	Bright	81 01 04 39 0D FF	Bright Mode(Manual control)
CAM_Iris	Reset	81 01 04 0B 00 FF	Iris Setting (CAM_AE is set to Iris Priority)
	Up	81 01 04 0B 02 FF	
	Down	81 01 04 0B 03 FF	
	Direct Iris Position	81 01 04 4B 00 00 0p 0q FF	min p = 0 q = 0 max p = 0, q = C
CAM_Gain	Reset	81 01 04 0C 00 FF	Gain Setting
	Up	81 01 04 0C 02 FF	
	Down	81 01 04 0C 03 FF	
	Direct	81 01 04 0C 00 00 0p 0q FF	pq: Gain Position
	Gain Limit	81 01 04 2C 0p FF	p: Gain Position

CAM_Bright	Reset	81 01 04 0D 00 FF	Bright Setting
	Up	81 01 04 0D 02 FF	
	Down	81 01 04 0D 03 FF	
	Direct	81 01 04 0D 00 00 0p 0q FF	pq: Bright Position
CAM_ExpComp	On	81 01 04 3E 02 FF	Exposure Compensation On/Off
	Off	81 01 04 3E 03 FF	
	Reset	81 01 04 0E 00 FF	Exposure Compensation Amount Setting
	Up	81 01 04 0E 02 FF	
	Down	81 01 04 0E 03 FF	
	Direct	81 01 04 4E 00 00 0p 0q FF	pq: ExpComp Position
CAM_BackLight	On	81 01 04 33 02 FF	Back Light Compensation On/Off
	Off	81 01 04 33 03 FF	
Camera control commands			
Command	**Function**	**Command Packet**	**Comments**
CAM_NR(2D)Mode	Auto	81 01 04 50 02 FF	ND2D Auto/Manual
	Manual	81 01 04 50 03 FF	
CAM_NR(2D)Level	-	81 01 04 53 0p FF	p: NR Setting (0: Off, level 1 to 5)
CAM_NR(3D)Level	-	81 01 04 54 0p FF	p: NR Setting (0: Off, level 1 to 8)
CAM_Flicker	0/50Hz/60Hz	81 01 04 23 0p FF	p: Flicker Settings (0: Off, 1: 50Hz, 2: 60Hz)
CAM_DHotPixel	-	81 01 04 56 0p FF	p: Dynamic Hot Pixel Setting (0: 0ff, level 1 to 6)
CAM_ApertureMode(sharpness)	Auto	81 01 04 05 02 FF	Sharpness Auto
	Manual	81 01 04 05 02 FF	Sharpness Manual
CAM_Aperture(sharpness)	Reset	81 01 04 02 00 FF	Aperture Control
	Up	81 01 04 02 02 FF	
	Down	81 01 04 02 03 FF	
	Direct	81 01 04 42 00 00 0p 0q FF	pq: Aperture Gain

CAM_PictureEffect	Off	81 01 04 63 00 FF	Picture Effect Setting
	B&W	81 01 04 63 04 FF	
CAM_Memory	Reset	81 01 04 3F 00 pp FF	pp: Memory Number(=0 to 127)
	Set	81 01 04 3F 01 pp FF	
	Recall	81 01 04 3F 02 pp FF	
CAM_LR_Reverse	On	81 01 04 61 02 FF	Image Flip Horizontal On/Off
	Off	81 01 04 61 03 FF	
CAM_PictureFlip	On	81 01 04 66 02 FF	Image Flip Vertical On/Off
	Off	81 01 04 66 03 FF	
CAM_ColorGain	Diret	81 01 04 49 00 00 00 0p FF	p: Color Gain setting 0h (60%) to Eh (200%)
SYS_Menu	Off	81 01 06 06 03 FF	Turns on/off the menu screen
	On	81 01 06 06 02 FF	

Camera control commands			
Command	**Function**	**Command Packet**	**Comments**
Pan_tiltDrive	Up	81 01 06 01 VV WW 03 01 FF	VV: Pan speed 0x01 (low speed) to 0x18 (high speed) WW: Tilt speed 0x01 (low speed) to 0x14 (high speed) YYYY: Pan Position ZZZZ: Tilt Position
	Down	81 01 06 01 VV WW 03 02 FF	
	Left	81 01 06 01 VV WW 01 03 FF	
	Right	81 01 06 01 VV WW 02 03 FF	
	Upleft	81 01 06 01 VV WW 01 01 FF	
	Upright	81 01 06 01 VV WW 02 01 FF	
	DownLeft	81 01 06 01 VV WW 01 02 FF	
	DownRight	81 01 06 01 VV WW 02 02 FF	
	Stop	81 01 06 01 VV WW 03 03 FF	
	AbsolutePosition	81 01 06 02 VV WW 0Y 0Y 0Y 0Y 0Z 0Z 0Z 0Z FF	
	RelativePosition	81 01 06 03 VV WW 0Y 0Y 0Y 0Y 0Z 0Z 0Z 0Z FF	
	Home	81 01 06 04 FF	
	Reset	81 01 06 05 FF	

Pan_tiltLimitSet	LimitSet	81 01 06 07 00 0W 0Y 0Y 0Y 0Y 0Z 0Z 0Z 0Z FF	W: 1 UpRight 0: Down-Left YYYY: Pan Limit Posi-tion ZZZZ: Tilt Position
	LimitClear	81 01 06 07 01 0W 07 0F 0F 0F 07 0F 0F 0F FF	
CAM_AFSensitivity	High	81 01 04 58 01 FF	AF Sensitivity High/ Normal/Low
	Normal	81 01 04 58 02 FF	
	Low	81 01 04 58 03 FF	
CAM_SettingReset	Reset	81 01 04 A0 10 FF	Reset Factory Setting
CAM_Brightness	Direct	81 01 04 A1 00 00 0p 0q FF	pq: Brightness Position
CAM_Contrast	Direct	81 01 04 A2 00 00 0p 0q FF	pq: Contrast Position

3 Inquiry commands

x = Camera Address
y = Socket Number
z = Camera Address + 8

All parameter values are in HEX

Inquiry Command			
Command	**Function**	**Command Packet**	**Comments**
CAM_ZoomPosInq	81 09 04 47 FF	90 50 0p 0q 0r 0s FF	pqrs: Zoom Position
CAM_FocusAF-ModeInq	81 09 04 38 FF	90 50 02 FF	Auto Focus
		90 50 03 FF	Manual Focus
CAM_FocusPosInq	81 09 04 48 FF	90 50 0p 0q 0r 0s FF	pqrs: Focus Position
CAM_WBModeInq	81 09 04 35 FF	90 50 00 FF	Auto
		90 50 01 FF	Indoor mode
		90 50 02 FF	Outdoor mode
		90 50 03 FF	OnePush mode
		90 50 05 FF	Manual
CAM_RGainInq	81 09 04 43 FF	90 50 00 00 0p 0q FF	pq: R Gain
CAM_BGainInq	81 09 04 44 FF	90 50 00 00 0p 0q FF	pq: B Gain
CAM_AEModeInq	81 09 04 39 FF	90 50 00 FF	Full Auto
		90 50 03 FF	Manual
		90 50 0A FF	Shutter priority
		90 50 0B FF	Iris priority
		90 50 0D FF	Bright
CAM_ShutterPo-sInq	81 09 04 4A FF	90 50 00 00 0p 0q FF	pq: Shutter Position
CAM_IrisPosInq	81 09 04 4B FF	90 50 00 00 0p 0q FF	pq: Iris Position
CAM_BrightPosInq	81 09 04 4D FF	90 50 00 00 0p 0q FF	pq: Bright Position

Inquiry Command			
Command	Function	Command Packet	Comments
CAM_ExpComp-Modelnq	81 09 04 3E FF	90 50 02 FF	On
		90 50 03 FF	Off
CAM_ExpCompPo-slnq	81 09 04 4E FF	90 50 00 00 0p 0q FF	pq: ExpComp Position
CAM_Backlight-Modelnq	81 09 04 33 FF	90 50 02 FF	On
		90 50 03 FF	Off
CAM_Noise2D-Modelng	81 09 04 50 FF	90 50 02 FF	Auto Noise 2D
		90 50 03 FF	Manual Noise 3D
CAM_Noise2DLevel	81 09 04 53 FF	90 50 0p FF	Noise Reduction (2D) p: 0 to 5
CAM_Noise3DLevel	81 09 04 54 FF	90 50 0p FF	Noise Reduction (3D) p: 0 to 8
CAM_Flicker-Modelnq	81 09 04 55 FF	90 50 0p FF	p: Flicker Settings(0: OFF, 1: 50Hz, 2: 60Hz)
CAM_Aperture-Modelnq(Sharp-ness)	81 09 04 05 FF	90 50 02 FF	Auto Sharpness
		90 50 03 FF	Manual Sharpness
CAM_Aperturein-q(Sharpness)	81 09 04 42 FF	90 50 00 00 0p 0q FF	pq: Aperture Gain
CAM_PictureEffect-Modelnq	81 09 04 63 FF	90 50 02 FF	Off
		90 50 04 FF	B&W
CAM_Memorylnq	81 09 04 3F FF	90 50 0p FF	p: Memory number last operated.
SYS_MenuModelnq	81 09 06 06 FF	90 50 02 FF	On
		90 50 03 FF	Off
CAM_LR_Rever-selnq	81 09 04 61 FF	90 50 02 FF	On
		90 50 03 FF	Off
CAM_PictureFliplnq	81 09 04 66 FF	90 50 02 FF	On
		90 50 03 FF	Off
CAM_ColorGainlnq	81 09 04 49 FF	90 50 00 00 00 0p FF	p: Color Gain setting 0h (60%) to Eh (200%)

Inquiry Command			
Command	Function	Command Packet	Comments
VideoSystemInq	81 09 06 23 FF	90 50 00 FF	1920x1080i60
		90 50 01 FF	1920x1080p30
		90 50 02 FF	1280x720p60
		90 50 04 FF	NTSC
		90 50 05 FF	NTSC
		90 50 06 FF	NTSC
		90 50 07 FF	1920x1080p60
		90 50 08 FF	1920x1080i50
		90 50 09 FF	1920x1080p25
		90 50 0A FF	1280x720p50
		90 50 0C FF	PAL
		90 50 0D FF	PAL
		90 50 0E FF	PAL
Pan-tiltMaxSpeed-dInq	81 09 06 11 FF	90 50 ww zz FF	ww: Pan Max Speed zz: Tilt Max Speed
Pan-tiltPosInq	81 09 06 12 FF	90 50 0w 0w 0w 0w 0z 0z 0z 0z FF	wwww: Pan Position zzzz: Tilt Position
CAM_GainLimitInq	81 09 04 2C FF	90 50 0q FF	p: Gain Limit
CAM_DHotPixelInq	81 09 04 56 FF	90 50 0q FF	p: Dynamic Hot Pixel Setting (0: 0ff, level 1 to 6)
CAM_AFSensitivityInq	81 09 04 58 FF	90 50 01 FF	High
		90 50 02 FF	Normal
		90 50 03 FF	Low
CAM_BrightnessInq	81 09 04 A1 FF	90 50 00 00 0p 0q FF	pq: Brightness Position
CAM_ContrastInq	81 09 04 A2 FF	90 50 00 00 0p 0q FF	pq: Contrast Position
CAM_FlipInq	81 09 04 A4 FF	90 50 00 FF	Off
		90 50 01 FF	Flip-H
		90 50 02 FF	Flip-V
		90 50 03 FF	Flip-HV
CAM_IridixInq	81 09 04 A7 FF	90 50 00 00 0p 0q FF	pq: Iridix Position
CAM_AFZone	81 09 04 AA FF	90 50 00 FF	Top
		90 50 01 FF	Center
		90 50 02 FF	Bottom
CAM_ColorHueInq	81 09 04 4F FF	90 50 00 00 00 0p FF	p: Color Hue setting 0h (- 14 degrees) to Eh (+14 degrees)
CAM_AWBSensitivityInq	81 09 04 A9 FF	90 50 00 FF	High
		90 50 01 FF	Normal
		90 50 02 FF	Low

Camera control commands CM7x specific			
Command	Function	Command Packet	Comments
CAM_TallyLight	Red	81 01 7E 01 0A 00 02 03 FF	Tally Light Red ON
	Green	81 01 7E 01 0A 00 03 02 FF	Tally Light Green ON
	Off	81 01 7E 01 0A 00 03 03 FF	Tally Light OFF

PELCO-D PROTOCOL COMMAND LIST

Function	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
Up	0xFF	Address	0x00	0x08	Pan Speed	Tilt Speed	SUM
Down	0xFF	Address	0x00	0x10	Pan Speed	Tilt Speed	SUM
Left	0xFF	Address	0x00	0x04	Pan Speed	Tilt Speed	SUM
Right	0xFF	Address	0x00	0x02	Pan Speed	Tilt Speed	SUM
Zoom In	0xFF	Address	0x00	0x20	0x00	0x00	SUM
Zoom Out	0xFF	Address	0x00	0x40	0x00	0x00	SUM
Focus Far	0xFF	Address	0x00	0x80	0x00	0x00	SUM
Focus Near	0xFF	Address	0x01	0x00	0x00	0x00	SUM
Set Preset	0xFF	Address	0x00	0x03	0x00	Preset ID	SUM
Clear Preset	0xFF	Address	0x00	0x05	0x00	Preset ID	SUM
Call Preset	0xFF	Address	0x00	0x07	0x00	Preset ID	SUM
Auto Focus	0xFF	Address	0x00	0x2B	0x00	0x01	SUM
Manual Focus	0xFF	Address	0x00	0x2B	0x00	0x02	SUM
Query Pan Position	0xFF	Address	0x00	0x51	0x00	0x00	SUM
Query Pan Position Response	0xFF	Address	0x00	0x59	Value High Byte	Value Low Byte	SUM
Query Tilt Position	0xFF	Address	0x00	0x53	0x00	0x00	SUM
Query Tilt Position Response	0xFF	Address	0x00	0x5B	Value High Byte	Value Low Byte	SUM
Query Zoom Position	0xFF	Address	0x00	0x55	0x00	0x00	SUM
Query Zoom Position Response	0xFF	Address	0x00	0x5D	Value High Byte	Value Low Byte	SUM

PELCO-P PROTOCOL COMMAND LIST

Function	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Up	0xA0	Address	0x00	0x08	Pan Speed	Tilt Speed	0xAF	XOR
Down	0xA0	Address	0x00	0x10	Pan Speed	Tilt Speed	0xAF	XOR
Left	0xA0	Address	0x00	0x04	Pan Speed	Tilt Speed	0xAF	XOR
Right	0xA0	Address	0x00	0x02	Pan Speed	Tilt Speed	0xAF	XOR
Zoom In	0xA0	Address	0x00	0x20	0x00	0x00	0xAF	XOR
Zoom Out	0xA0	Address	0x00	0x40	0x00	0x00	0xAF	XOR
Focus Far	0xA0	Address	0x00	0x80	0x00	0x00	0xAF	XOR
Focus Near	0xA0	Address	0x01	0x00	0x00	0x00	0xAF	XOR
Set Preset	0xA0	Address	0x00	0x03	0x00	Preset ID	0xAF	XOR
Clear Preset	0xA0	Address	0x00	0x05	0x00	Preset ID	0xAF	XOR
Call Preset	0xA0	Address	0x00	0x07	0x00	Preset ID	0xAF	XOR
Auto Focus	0xA0	Address	0x00	0x2B	0x00	0x01	0xAF	XOR
Manual Focus	0xA0	Address	0x00	0x2B	0x00	0x02	0xAF	XOR
Query Pan Position	0xA0	Address	0x00	0x51	0x00	0x00	0xAF	XOR
Query Pan Position Response	0xA0	Address	0x00	0x59	Value High Byte	Value Low Byte	0xAF	XOR
Query Tilt Position	0xA0	Address	0x00	0x53	0x00	0x00	0xAF	XOR
Query Tilt Position Response	0xA0	Address	0x00	0x5B	Value High Byte	Value Low Byte	0xAF	XOR
Query Zoom Position	0xA0	Address	0x00	0x55	0x00	0x00	0xAF	XOR
Query Zoom Position Response	0xA0	Address	0x00	0x5D	Value High Byte	Value Low Byte	0xAF	XOR

APPENDIX B DIMENSIONS